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Herpetofauna of Mormon Island Preserve Hall County, Nebraska

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INTRODUCTION

Studies of reptiles and amphibians in the grasslands of North America have primarily concerned the compilation of state faunal lists (e.g. Smith 1956, Hudson 1942, Webb 1970, Wheeler and Wheeler 1966). There have been a large number of reports on range extensions to augment this basic data. With the exception of the extensive studies by Fitch (1954, 1956, 1958, 1960, 1963) primarily on reptiles and Bragg (1940a, 1940b, 1943, 1953) primarily on anurans, the ecology of the herpetiles of the grasslands are not well studied. Lynch (1978) provided an excellent analysis of the ecological distributions of the leopard frogs in Nebraska. Werth (1972) presented preliminary observations on the competition of lizards. Other recent studies have concerned the ecology of herpetiles of specific sites (Platt 1973, 1975, Ballinger et al. 1979, Jones and Droge 1980). Our future understanding of the ecology of the prairie will depend largely on detailed studies of these and comparably preserved sites because of the extensive fragmentation of the central grasslands by agricultural practices. The purposes of the present study were to determine the herpetofaunal composition of a newly created nature preserve in south central Nebraska, and to outline the general natural history of the species present.

MATERIALS AND METHODS

Description of Study Area

The study was conducted between 19 April and 29 September 1980 on the Mormon Island Preserve located on the Platte River eight miles south of Grand Island, Hall County, Nebraska. The preserve was established by the cooperative efforts of the Platte River Whooping Crane Critical Habitat Maintenance Trust and The Nature Conservancy primarily as a site for use by sandhill cranes and whooping cranes during their migratory patterns. The preserve is approximately 2000 acres in area and consists primarily of wet meadow grassland bounded on the north, south, and west margins by the Platte River. The greater part of the preserve is presently grazed with a large portion planted with row crops. Major features of preserve include two small woodlots predominated by a variety of deciduous trees. The peripheral areas along the flood plain of the river are also oc-

cupied by a narrow belt of wooded area interspersed with heavy shrub growth. Other features include two small ponds located on the southern edge of the preserve. The easternmost pond is isolated from the river whereas the western pond is in direct contact with the river channel during periods of high water. A map of the preserve denoting major habitat types is presented in Fig. 1.

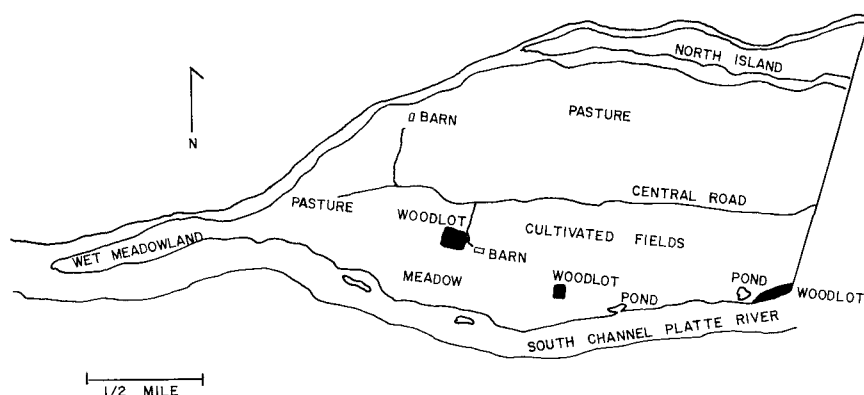


Figure 1. Map of Mormon Island Preserve denoting major habitat types.

Collection Techniques

Most of the sampling was conducted by thorough searches of all areas of the preserve. Fallen trees, loose boards, and other debris, buildings, and all other potential habitats were carefully examined for any herpetiles that may have been present. Drift fences with funnel traps were also used at selected sites within the preserve for the purpose of collecting snakes. Techniques used for the capture of turtles included seining, turtle traps, and fyke-nets. The traps and fyke-net were baited with freshly killed fish. Voucher specimens of each species of herpetile were preserved and deposited in the University of Nebraska State Museum in Lincoln.

Annotated Species Accounts

A total of ten species of herpetiles were recorded on the Mormon Island preserve. These included three amphibians (all anurans) and seven reptiles. The reptiles were represented by three turtles, two lizards, and two snakes. Voucher specimens were obtained for all species with the exception of one of the turtles.

Amphibia

Anura — Frogs and Toads

Pseudacris triseriata (Striped Chorus Frog). This species of chorus frog is widely distributed throughout the southeastern United States into the Plains states and northward into Canada. Two subspecies are recognized in Nebraska — one occurring in the western portion of the state (*P. t. maculata*) and the other in the eastern portion (*P. t. triseriata*). The latter is the subspecies at Mormon Island. There is a relatively broad zone of integration between the two subspecies diagonally across Nebraska from southwest to northeast. The Mormon Island preserve is located just east of this zone of integration.

The favored habitats of the chorus frog are swamps and marshes. They are highly aquatic but appear to prefer smaller bodies of water. They may also occur in roadside ditches or farm ponds as well as temporary pools in pastures or small streams. These frogs are nocturnal and presumably hide in the mud bottoms of temporary ponds or among the grass as these ephemeral ponds dry up. Chorus frogs were most common in standing water in the western finger of the island where several hundred individuals were found. A smaller group was also located along a road-side ditch. The peak of the calling activity was in mid-April and continued into early May at which time only a few scattered individuals were heard calling. As indicated by our observations, striped chorus frogs are “cool season” frogs and are rarely seen in summer and fall. Depending on the length of the winter they probably appear as early as March and end breeding by late-May. The diet of these frogs consists primarily of insects.

Bufo woodhousii (Woodhouse's Toad). This toad is widely distributed throughout the United States extending from the east coast westward into Idaho, Utah, and Arizona. It is common in all parts of Nebraska. Woodhouse's toad is found in a variety of habitats including long grass and mixed grass prairies. This toad also appears to be tolerant of human activity as evidenced by its co-occurrence with human habitations. It will breed in most bodies of water and is not totally dependent on rain for reproduction. It often lays several thousand eggs throughout the breeding season. The diet of Woodhouse's toad consists primarily of insects and Smith (1956) reported that it has been known to consume as much as two-thirds of its body volume in insects over a period of 24 hours. This species of toad is primarily crepuscular or nocturnal but is occasionally active during the day. It was first observed at the Mormon Island preserve around the first of May and throughout the study period with the exception of mid-April. It was most common along the sandy banks of the Platte River but was also found under logs, leaves, and other debris in the riparian forest edge community. No large breeding choruses were heard during the study. One specimen was found in the stomach of the garter snake, *Thamnophis sirtalis*.

Rana blairi (Plains Leopard Frog). The plains leopard frog is distributed through the plains states with a narrow belt extending through northern Missouri into Illinois. It occurs only in the eastern half of Nebraska. The plains leopard frog is the most aquatic of the Mormon Island anurans. It is generally associated with permanent bodies of water but may also be found in temporary water (e.g. road-side ditches). In Nebraska, Lynch (1978) reports that *R. blairi* is ecologically

separated from its close relative, *R. pipiens*, on the basis of its preference for loess rather than sandy soils. The breeding season of the plains leopard frog extends from March through May. Because of the long larval period, it does not fully metamorphose until mid-summer. It is insectivorous and feeds primarily on non-aquatic arthropods. This anuran is diurnal or nocturnal (particularly during the breeding season). It spends the winter months in hibernation in permanent ponds below the frost line (Smith 1956). This was the most abundant herpetile at the Mormon Island Preserve. It was first seen in April (when it was also heard calling) and was common throughout the study. Egg masses were common in mid-April where they were found attached to aquatic vegetation. Metamorphosed frogs were first observed in mid-June.

Reptilia

Chelonia-Turtles

Chelydra serpentina (Snapping Turtle). This snapping turtle occurs over the eastern two-thirds of the United States east of the Rocky Mountains from southern Canada to central Texas. It is common throughout Nebraska. The snapping turtle is highly aquatic and is generally associated with permanent water (e.g. large ponds and rivers) with mud bottoms. Because it is a poor swimmer, the snapping turtle spends most of its time in mud bottoms, where it also hibernates. Eggs are laid during June in shallow nests at or near the water's edge. It is omnivorous with a diet consisting of 35-70% aquatic plants, 6-35% fish, in addition to some invertebrates and carrion (Smith 1956). The snapping turtle was found in both ponds at Mormon Island. It was observed on the first visit in April and was active throughout the study.

Trionyx spiniferus (Spiny Softshell). The spiny softshell turtle is distributed throughout the southern United States northward into portions of the plains and mid-eastern states. In Nebraska, it occurs along the southern and eastern margins of the state. This species is highly aquatic and is rarely observed out of water. Consequently, it has a very high affinity for permanent bodies of water, preferably with soft substrates. It burrows in those soft substrates as an escape mechanism and also uses them for hibernation. The spiny softshell turtle lays its eggs during early summer buried in nests usually no farther than 25 feet from water's edge. The diet of this turtle consists of a variety of food items including worms, insects, molluscs, crayfish, fish, and frogs. It is diurnal and extremely secretive, but can occasionally be observed basking on river banks or foraging in the water. It was first sighted at Mormon Island in June and was active throughout the census period.

Chrysemys picta (Painted Turtle). This turtle occurs from the eastern United States southwesterly into Louisiana, westward through the plains states and northwesterly into Washington and Canada. It is found in all parts of Nebraska. It is commonly found in warm, shallow bodies of water such as ponds, ditches, shallow lakes, and still pools in rivers. It lays its eggs during June and July and nests away from water. The diet of the painted turtle consists of approximately 50% vegetative material (algae, leaves of aquatic plants) and 50% animal material (worms, molluscs, insects in addition to some fish, tadpoles, and frogs). The painted turtle hibernates from late October through April in the mud bottoms of

shallow streams and ponds. This species was not captured at the Mormon Island preserve but it was observed in the east pond in mid-June. It is present but is obviously rare.

Squamata (Sauria) — Lizards

Eumeces septentrionalis (Prairie Skink). This skink is distributed along a narrow band through the plains states from northern Minnesota to southeastern Texas. It occurs in the eastern third of Nebraska. The prairie skink, as its name implies, is restricted to grasslands. Additionally, it requires soft soil in which it builds tunnels beneath logs and flat rocks. The prairie skink is oviparous with mating occurring in late May, egg laying in late June to early July, and hatching in mid to late August (Breckenridge 1943). Its diet consists of 27% orthopterans, 30.5% arachnids, and 28% homopterans, coleopterans, and lepidopterans. Hibernation begins in late October with males emerging in April and females in May. The prairie skink at Mormon Island was most common along the riparian woodlands underneath debris. It was not found in the central pasture. It was first observed in mid-April and was active throughout the study.

Cnemidophorus sexlineatus (Six-lined Racerunner). The six-lined racerunner ranges from the southern to southeastern United States northwestward into Nebraska, Kansas, and Colorado. In Nebraska, it occurs in all but the northeastern and northwestern corners of the state. This is the best studied of the herpetiles occurring at Mormon Island with several accounts of its natural history reported in the literature (Fitch 1958, Hardy 1962, Werth 1972). This lizard occupies dry, open areas with loose or sandy soils. It may be found in some areas of short grass or vegetation but does not occur in tall grass prairie. It is oviparous and the clutch size is small (2-4 eggs). Eggs are laid in early June and hatch in July. The diet of the racerunner consists of a broad range of insects. Because of its high preferred body temperature, it is generally most active during the hottest part of the day. In contrast to most lizards, the racerunner is an active forager (rather than sit-and-wait). Consequently, the home range of this species tends to be large. At Mormon Island, it was most abundant along the southern edge of the island and was almost always associated with sand. The racerunner was first observed in early May and remained active throughout the study.

Squamata (Serpentes) — Snakes

Thamnophis radix (Plains Garter Snake). This species ranges from the plains states eastward to northeastern Indiana and northward into Canada. It occurs in all parts of Nebraska. The preferred habitats of this snake include marshes, swamps, and grassy areas along streams and around ponds. In Nebraska, it is particularly abundant in wet meadows and riparian woodlands where large trees and fallen logs provide shelter during hibernation. The plains garter snake also hibernates in ant hills at depths of several inches to a few feet below ground level. It is viviparous with mating occurring in late spring. The young are born mid to late summer. The snake's diet consists of earthworms, insects, tadpoles and frogs (Chance 1971). This species exhibits seasonal patterns of activity, being diurnal in the spring and nocturnal in the summer. It is suggested that this be-

havior is influenced by temperature (Heckrotte 1962). This species was observed throughout the Mormon Island preserve. It was most common along the Platte River, wet meadows, or around large trees, but was also occasionally found in dry prairie habitat. This snake appeared to be most active in June.

Thamnophis sirtalis (Common Garter Snake). The common garter snake occurs throughout the eastern half of the United States into the northern plains states and Canada westward into Washington and down the coast of California. In Nebraska, it occurs in all but the southwestern tip of the panhandle. This species is most common along streams, ponds, and wet meadows. It tends to stay near water and areas where cover under logs, stones, and debris can be easily found. Several studies have reported reproductive characteristics of this viviparous species (Blanchard and Blanchard 1941, Boyer 1941, Carpenter 1952, Fitch and Maslin 1961, Lagler and Salyer 1945, Martof 1954, Zehr 1962). Mating is in early spring and parturition in mid-summer. The diet of the common garter snake consists of earthworms, tadpoles, frogs, and toads. At Mormon Island, this snake was most common near ponds and along the river. It was observed from early May through late July.

NOTES ON SPECIES NOT FOUND

There are several other species of herpetiles that have been reported for Hall County but were not found on the Mormon Island Preserve. The following is an account of those species along with a brief discussion as to the possible reasons for their absence.

Bufo cognatus (Great Plains Toad). This toad is generally associated with large temporary ponds which are requisites for breeding. It characteristically forms breeding choruses in "buffalo wallows" or other low areas in drier habitats. Because it spends most of its life underground, the level of the water may limit its occurrence. The relatively high water table at the preserve along with the lack of large temporary ponds may account for the absence of this species at Mormon Island.

Rana catesbeiana (Bullfrog). It is expected that the bullfrog might occur along the Platte river and in either of the large ponds. However, it is relatively uncommon in western Nebraska except where there are extensive marshes associated with large ponds or lakes. Marshes of this sort are not characteristic of the Mormon Island Preserve.

Acris crepitans (Cricket Frog). This species has been reported along the Platte River just east of Mormon Island. Hall County is at the northern edge of its distribution where reported observations have been rare. Apparently, the occurrence of the cricket frog in this part of Nebraska is restricted to small, isolated populations. This being the case, it is not too surprising that it was not found on Mormon Island.

Hyla chrysocelis (Gray Treefrog). This species has been reported in Hall County which represents the westernmost record in Nebraska. The preferred habitat of the gray treefrog is permanent water associated with woodlands. The habitats at Mormon Island are at best marginal for the occurrence of this species.

Terrapene ornata (Ornate Box Turtle). This box turtle is highly terrestrial relative to most turtles. It prefers sandy open areas and is uncommon in dense

prairies or wet meadows. Its preference for sandy, open areas probably excludes the box turtle from the preserve.

In addition to the above herpetiles, several species of snakes that have been recorded from Hall County are absent on the Mormon Island Preserve. Several factors may contribute to the absence of many of the snake species. In general, snakes require larger areas than other herpetiles on account of their wandering habits. Furthermore, their position in the trophic level (i.e. carnivores) necessitates relatively large feeding ranges and as a consequence snakes are usually less common on islands, particularly terrestrial species. One additional factor is that the high water table at Mormon Island prevents snakes from having suitable deep space for hiding and hibernation, which may restrict the number of species on the preserve. Two common terrestrial species of snakes that may be absent for the reasons given are the racer (*Coluber constrictor*) and the bullsnake (*Pituophis catenifer*).

The lined snake (*Tropidoclonion lineatum*) has been recorded in Hall County but is near its northern distributional limit and is thus probably rare in this part of Nebraska. It is nocturnal and spends most of its time under logs and other cover and does not tolerate very wet conditions.

SUMMARY OF HERPETOFAUNA OF MORMON ISLAND

A total of ten herpetiles were reported for the Mormon Island Preserve. Each of the ten species occurring on the preserve is associated at least to some degree with aquatic habitats or riparian woodlands. The grazing and agricultural practices currently carried out at Mormon Island have apparently restricted the herpetofauna to those habitats. Herpetiles requiring large, permanent bodies of water and those burrowing species which prefer areas characterized by low water tables as well as highly terrestrial herpetiles are conspicuously absent from the Mormon Island Preserve.

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